CREAMER ENVIRONMENTAL, INC.
CONTRACTORS & CONSULTANTS
12 Old Bridge Road, Cedar Grove, NJ 07009
201-968-3300 Fax (201) 968-3301

# LETTER OF TRANSMITTAL

| | |
|---|---|
| **DATE: 3/18/16** | **JOB NO.: 16-0463** |
| **ATTENTION: Nicholas Steenhaut** | |
| **RE: Metal Bank NPL Site** | |
| | |
| | |

**TO** **Environ International Corporation**
**20 Custom House Street**
**Boston, MA 02110**

**WE ARE SENDING YOU** ☒ Attached ☐ Under separate cover via_____the following items:
☐ Shop Drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____

| COPIES | DATE | PAGES | DESCRIPTION |
|---|---|---|---|
| 1 | 3/18/2016 | 3 | **Submittal #9.2 Monitoring Plan** |
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**THESE ARE TRANSMITTED as checked below:**
☒ For Acceptance ☐ Approved as submitted ☐ Resubmit ____ copies for approval
☐ For your use ☐ Approved as noted ☐ Submit ____ copies for distribution
☐ As requested ☐ Returned for corrections ☐ Return ____ corrected print
☐ Review & comment ☐ _____

**REMARKS**

**COPY TO:**

**SIGNED:** Meghan Murphy
**Meghan Murphy**
**Project Coordinator**

CREAMER ENVIRONMENTAL, INC.
REMEDIATION CONTRACTORS
12 OLD BRIDGE ROAD - CEDAR GROVE, NEW JERSEY 07009
(201) 968-3300 • FAX (201) 968-3301

# Metal Bank NPL Site
# Philadelphia, PA
# Monitoring Plan

There are currently eight existing survey monitoring prisms, Targets A through H, located along the sheet pile bulkhead. Creamer Environmental, Inc. (CEI) will utilize these points as well as establish additional survey monitoring points as a part this Monitoring Plan. Louis J. Weber and Associates (Weber) will be the licensed professional surveyor performing the work. Please see the attached figure for monitoring point locations and a summary of monitoring frequencies. Also attached is a cut sheet for the angled reflective monitoring targets which will be installed as the new survey monitoring points are accurate to within .25" which is sufficient to achieve the monitoring requirements for movement as per the Monitoring section on Contract Figure 1. The targets will be mounted directly to the steel with epoxy and will remain in-place once the work is completed. Prior to the start of work, CEI will monitor the existing points and the newly installed survey monitoring points to establish a baseline.

CEI will monitor the Targets A through H twice per week when only rip rap installation is occurring. Continuous monitoring will be performed during the detensioning for the waler repair and proof testing of the tie-rods.

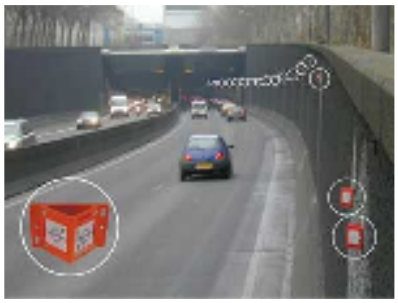
At each of the proof test locations not associated with the waler repair, Tie-Rod IDs T-2, T-5, T-14, T-28 and T-39, targets will be established to be monitored during the proof testing activities at that location and one time subsequent to the anchor being locked off at the specified capacity. One target will be placed directly behind the tie-rod being tested and one on either side of the tie-rod halfway to the next tie-rod location. At T-28 and T-39, the existing Targets D and B, respectively, will be used rather than installing a new target.

Where the waler is being repaired a target will be established behind each tie-rod as well as one tie-rod beyond either end of the repair, Tie-Rod IDs T-22 through T-26. These targets will be monitored during the detensioning of the tie-rods in the waler repair area and during proof testing at that location as well as one time subsequent to the work.

The monitoring measurements will be compared to the baseline survey and in the event that movement of .5" or greater is observed, the Construction Manager and RA Consultants LLC (RAC) will be notified immediately. The same notifications will be made if sudden changes in the sheet pile wall or other site structures are observed. Monitoring reports will be provided to the Construction Manager and RAC upon receipt from the surveyor.

Rev. 2 March 18, 2016

investment in high tech survey equipment. Save crew time, keep employees out of danger, get better data, and feel more secure about construction layout: can you afford *not* to use Rothbucher Systeme markers?



**RSAK80 & RSAK130 Survey Target Adapter w/ Reflective Angle Target**

- Unmistakeable measurement points.

- For monitoring railway tracks where there is surrounding building work (bridge and tunnel construction, pressure grouting of railway lines etc.)
- Measurement and monitoring are possible from almost any angle at locations which are difficult to access.
- Roads no longer need to be closed or obstacles crossed as every measurement point can be checked from a distance of up to 200 m (range depends on the measurement equipment)
- 3-dimensional monitoring of bridges.
- Simple and quick measurement and monitoring of buildings, facades, supporting structures, pillars, high rack storage facilities, dams and much more.
- For monitoring formwork during the concrete work, e.g. in the case of bridge arches and single-faced wall formworks.
- For monitoring earth and rock movements - e.g. up steep ascents or along cliffs.

Please note: Adapter with target reflectors are exclusively recommended for carrying out distance measurements using a tachymeter or total station.

# MONITORING PLAN

LEGEND: A baseline for each existing prism and the newly installed survey monitoring points is to be established before work begins.

- SURVEY MONITORING POINT (PRISM) — Targets A-H: Monitor 2 times a week during rip rap installation and continuously during the detensioning for the waler repair and proof testing.
- (P) PREFERRED TIE-ROD TEST LOCATION = Actual Tie-Rod Test Locations in addition to Test Locations at T-22 through T-26
- (A) ALTERNATE TIE-ROD TEST LOCATION
- INSTALLATION OF ADDITIONAL SURVEY MONITORING POINTS (13 Total) — Monitor during proof testing and one time after the anchor is locked off at the specified capacity, including Targets B and D.
- INSTALLATION OF ADDITIONAL SURVEY MONITORING POINTS (5 Total) — Monitor during the detensioning for the waler repair and during proof testing as well as one time after the anchor is locked off at the specified capacity.

NO MATERIALS OR EQUIPMENT SHALL BE PLACED OR STAGED IN THIS ZONE UNLESS CONTRACTOR CAN DEMONSTRATE THAT THE SURCHARGE WILL NOT LOAD THE SHEET PILE WALL

WORK AND STAGING ZONE

TIE-ROD I.D. & DESIGN LOAD BASED ON AS-INSTALLED SPACING

EXISTING DEADMAN (TYP)

EXISTING TIE-ROD (TYP)

EXISTING SHEET PILE WALL (TYP)

APPROXIMATE LIMITS OF ZONE 1 186'-6"±

APPROXIMATE LIMITS OF ZONE 2

APPROXIMATE LIMITS OF ZONE 3 111'-3"±

SHEET PILE WALL WALE TO BE REPAIRED (REFER TO FIG. 3)

EXISTING GRADE EL (TYP.)

BOULDERS

TARGET A

TARGET B

TARGET C

TARGET D

TARGET E

TARGET F

TARGET G

TARGET H

C-C FIG. 4

B-B FIG. 4

2 FIG. 3

A-A FIG 4

51'-0"±

42'-0"±

46'-6"±

152'-1"±

31'-0"±

25'-2"±

18'-0"±

300'-9"±

113'-5"±

APROXIMATE EXTENTS OF STABILIZING BERM. SLOPE 1V:3H OR FLATTER. T.O. BERM EL. +2±0.5'

APPROXIMATE EXTENTS OF STABILIZING BERM. SLOPE 1V:3H OR FLATTER. T.O. BERM EL. +2±0.5'

Western Subaqueous Buttress (11/2009)

Western Subaqueous Cap (11/2009)

1 STABILIZING BERM PLAN
Scale: 1/16" = 1'-0"

KEY PLAN


NOT TO SCALE



| REV. | DATE | DETAILS |
|---|---|---|
| | 01/07/16 | REVISED WALER REPAIR |
| | 8/14/15 | REVISED NOTES ON FIGURE 1 |
| | 7/24/15 | REVISED REPAIR DETAILS |
| | 4/16/15 | REVISED REPAIR DETAILS |
| | 3/6/15 | NEW BATHYMETRIC SURVEY |

PROJECT
**METAL BANK SITE**
**PHILADELPHIA, PA**

TITLE
STABILIZING BERM PLAN

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SEAL AND SIGNATURE

DATE: 1 OCTOBER, 2014
PROJ. NO.: 12C1135
DRAWN BY: JR / JJC
CHECKED BY: WJP
DRAWING: FIGURE 2
SHEET: SHEET 2 OF 4